

## Claims:

1. A reactive dye compound comprising:

- (a) at least one chromophore moiety  
 (b) at least one  $\text{SO}_2\text{C}_2\text{H}_4$  group which is attached to the chromophore moiety either directly via the sulphur atom of the  $\text{SO}_2\text{C}_2\text{H}_4$  group or via a linking group L;

characterised in that at least one  $\text{SO}_2\text{C}_2\text{H}_4$  group is substituted on its terminal carbon atom with at least one Y group wherein Y is  $-\text{A}(\text{CO})\text{R}^*$  wherein A is selected from O or S and wherein  $\text{R}^*$  is an organic residue which contains at least one nucleophilic group, such as OH,  $\text{NH}_2$ , SH, COOH, N,  $\text{NHR}^1$  and  $\text{NR}^1\text{R}^2$  wherein  $\text{R}^1$  and  $\text{R}^2$  may be the same or different and may be selected from C1-C4 alkyl; and salts thereof.

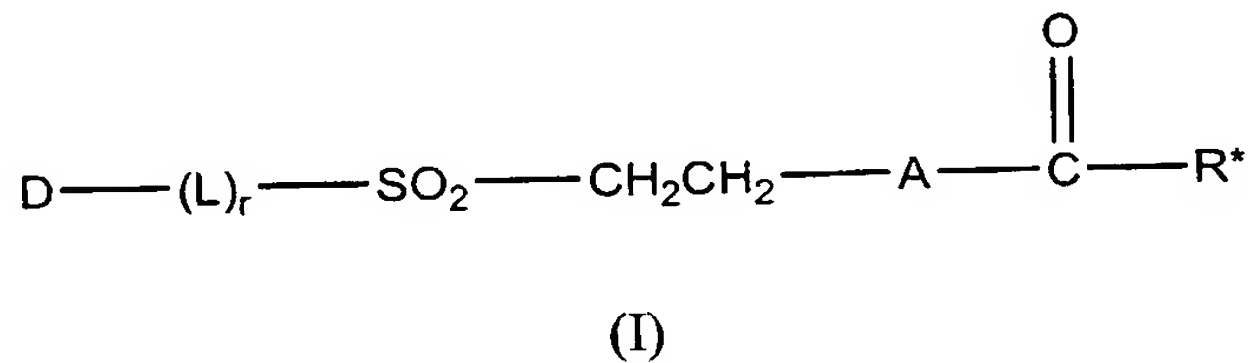
2. A reactive dye compound according to Claim 1 wherein  $\text{R}^*$  is selected from  $(\text{CH}_2)_n\text{SH}$ ,  $(\text{CH}_2)_n\text{NH}_2$ ,  $\text{CH}(\text{CH}_3)\text{OH}$ ,  $\text{CH}(\text{CH}_3)\text{O}(\text{CO})\text{CH}(\text{CH}_3)\text{OH}$  (i.e. a polyester of lactic acid),  $\text{R}^*$  derived from a polyester of citric acid,  $\text{CH}(\text{OH})(\text{CH}_2\text{COOH})_2$ ,  $\text{CH}_2(\text{OH})(\text{CO}_2\text{H})\text{CH}_2\text{COOH}$ ,  $\text{C}(\text{OH})(\text{H})\text{CH}_2\text{COOH}$ ,  $\text{CH}_2\text{C}(\text{H})(\text{OH})\text{COOH}$ ,  $\text{C}(\text{OH})(\text{H})\text{C}(\text{OH})(\text{H})\text{COOH}$ ,  $(\text{CH}_2)_n\text{NHR}^1$ ,  $\text{CH}_2\text{NR}^1\text{R}^2$ ,  $\text{CH}_2\text{NHNH}_2$ ,  $\text{CH}_2\text{NHOH}$ ,  $\text{CH}_2\text{SMe}$ ,  $\text{CHNH}_2(\text{CH}_2)_n(\text{COOH})$ ,  $\text{CHNH}_2\text{CH}_2\text{SMe}$ ,  $\text{CHNH}_2\text{CH}_2\text{SSCH}_2\text{CHNH}_2\text{COOH}$ ,  $\text{CHNH}_2\text{CH}_2\text{SO}_3\text{H}$ ,  $\text{C}_6\text{H}_4\text{OH}$ ,  $\text{C}_6\text{H}_4\text{COOH}$ ,  $\text{C}_6\text{H}_4\text{NH}_2$ ,  $\text{C}_6\text{H}_4\text{N}$ ,  $(\text{CH}_2)_n\text{C}_6\text{H}_4\text{N}$ ,  $\text{CH}(\text{R}\#)\text{NH}_2$ ,  $(\text{CH}_2)_n\text{-SSO}_3^-$ ,  $(\text{CH}_2)_n\text{-S-S-}(\text{CH}_2)_n$ , peptide of polypeptide, wherein  $\text{R}_1$  and  $\text{R}_2$  is independently selected from C1-C4 alkyl, wherein n is an integer in the range of 1 to 4 wherein within the same molecule n is not necessarily the same integer and wherein  $\text{R}\#$  corresponds to an amino acid sidechain.

3. A reactive dye according to Claim 1 or 2 wherein  $\text{R}^*$  is selected  $(\text{CH}_2)_n\text{SH}$ ,  $(\text{CH}_2)_n\text{NH}_2$ ,  $\text{C}_6\text{H}_4\text{N}$ ,  $\text{CH}(\text{R}\#)\text{NH}_2$ ,  $\text{CH}(\text{CH}_3)\text{OH}$ ,  $\text{CH}(\text{CH}_3)\text{O}(\text{CO})\text{CH}(\text{CH}_3)\text{OH}$ ,  $\text{C}(\text{OH})(\text{CH}_2\text{COOH})_2$ ,  $\text{CH}_2\text{C}(\text{OH})(\text{COOH})\text{CH}_2\text{COOH}$ ,  $\text{C}(\text{H})(\text{CH}_3)\text{OH}$ ,  $\text{C}(\text{H})(\text{OH})\text{CH}_2\text{COOH}$ ,  $\text{CH}_2\text{C}(\text{H})(\text{OH})\text{COOH}$ ,  $\text{C}(\text{H})(\text{OH})\text{C}(\text{H})(\text{OH})\text{COOH}$ ,  $\text{C}_6\text{H}_4\text{OH}$ ,  $\text{C}_6\text{H}_4\text{NH}_2$ .

4. A reactive dye compound according to any of Claims 1 to 3 wherein  $\text{R}^*$  is  $\text{C}(\text{OH})(\text{CH}_2\text{COOH})_2$  or  $\text{CH}_2\text{C}(\text{OH})(\text{COOH})\text{CH}_2\text{COOH}$ .

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5. A reactive dye compound according to any of Claims 1 to 4 wherein A is O.
6. A reactive dye compound having the formula (I):



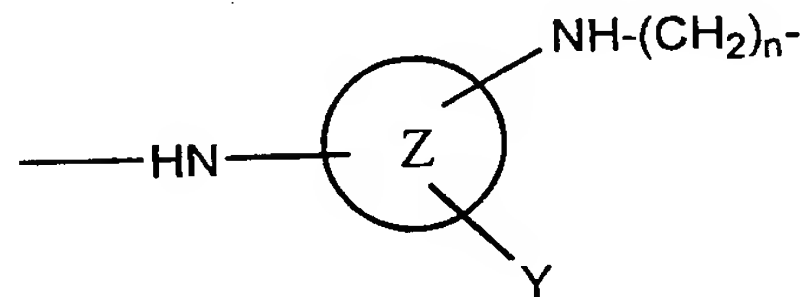
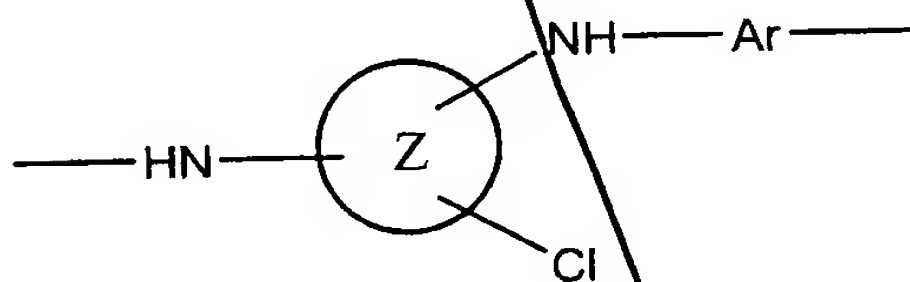
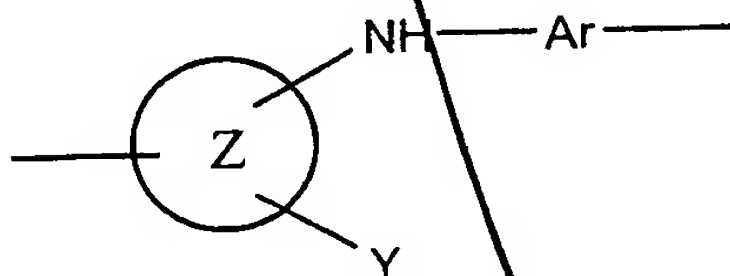
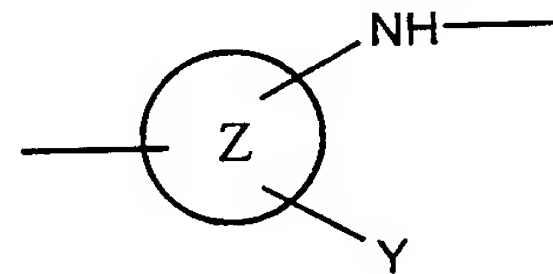
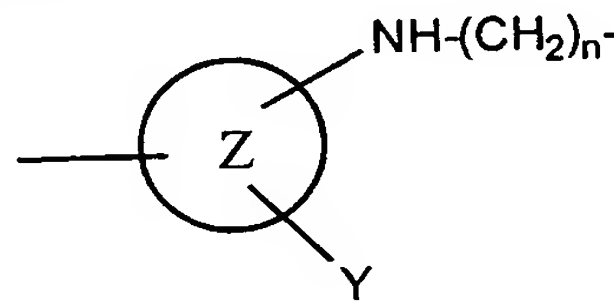
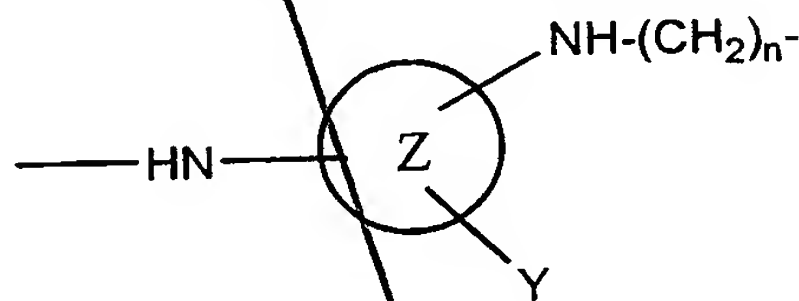
wherein:

D is a chromophore group;

r is 0 or 1;

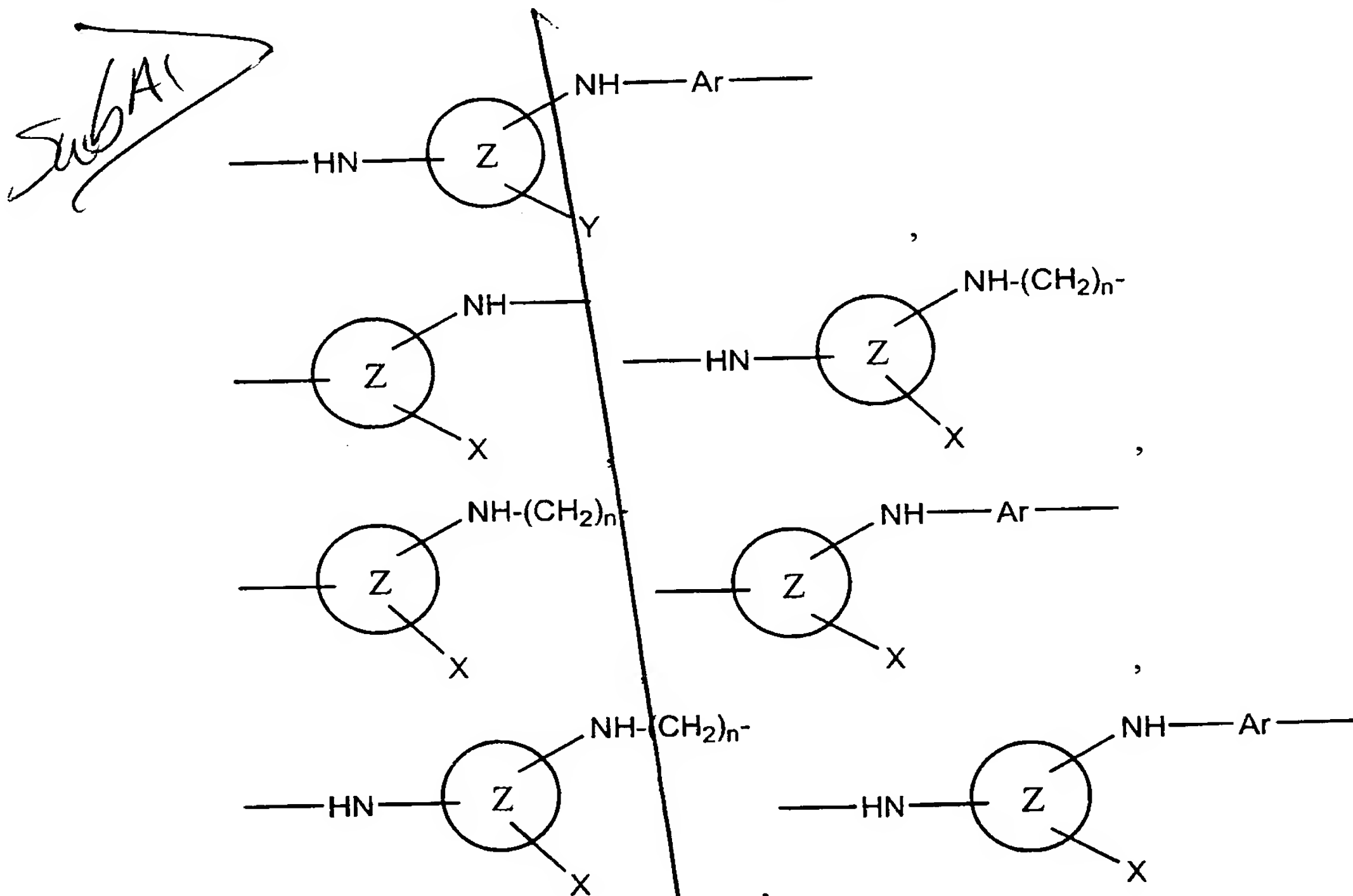
L is a linking group selected from NH, (CH<sub>2</sub>)<sub>n</sub>, N-(CH<sub>2</sub>)<sub>n</sub>N, -(CH<sub>2</sub>)<sub>n</sub>-N,

NR (R is C1-C4 alkyl),



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Sub A1



wherein Ar is an aryl group, preferably benzene, Y is halogen or  $O(C=O)R^*$ , n is an integer of from 1 to 4, Z is a nitrogen-containing heterocycle, X is selected from thio-derivatives, halogen (preferably fluorine and chlorine), amines, alkoxy groups, carboxylic acid groups, CN,  $N_3$ , and quaternized nitrogen derivatives,  $Q^+$ ;

A is O or S,

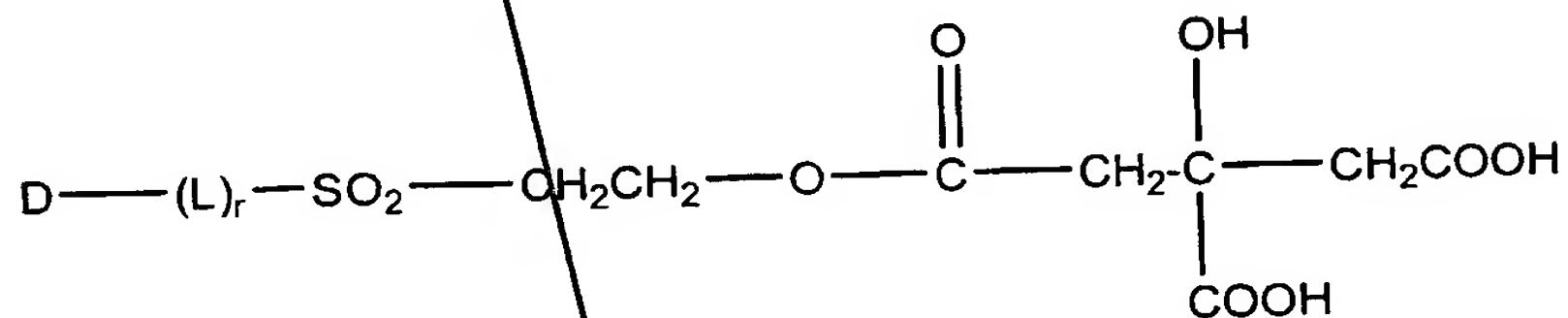
R\* is selected from (CH<sub>2</sub>)<sub>n</sub>SH, (CH<sub>2</sub>)<sub>n</sub>NH<sub>2</sub>, CH(CH<sub>3</sub>)OH, CH(CH<sub>3</sub>)O(CO)CH(CH<sub>3</sub>)OH (i.e. a polyester of lactic acid), R\* derived from a polyester of citric acid, CH(OH)(CH<sub>2</sub>COOH)<sub>2</sub>, CH<sub>2</sub>(OH)(CO<sub>2</sub>H)CH<sub>2</sub>COOH, C(OH)(H)CH<sub>2</sub>COOH, CH<sub>2</sub>C(H)(OH)COOH, C(OH)(H)C(OH)(H)COOH, (CH<sub>2</sub>)<sub>n</sub>NHR<sup>1</sup>, CH<sub>2</sub>NR<sup>1</sup>R<sup>2</sup>, CH<sub>2</sub>NHNH<sub>2</sub>, CH<sub>2</sub>NHOH, CH<sub>2</sub>SMe, CHNH<sub>2</sub>(CH<sub>2</sub>)<sub>n</sub>(COOH), CHNH<sub>2</sub>CH<sub>2</sub>SMe, CHNH<sub>2</sub>CH<sub>2</sub>SSCH<sub>2</sub>CHNH<sub>2</sub>COOH, CHNH<sub>2</sub>CH<sub>2</sub>SO<sub>3</sub>H, C<sub>6</sub>H<sub>4</sub>OH, C<sub>6</sub>H<sub>4</sub>COOH, C<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>, C<sub>6</sub>H<sub>4</sub>N, (CH<sub>2</sub>)<sub>n</sub>C<sub>6</sub>H<sub>4</sub>N, CH(R#)NH<sub>2</sub>, (CH<sub>2</sub>)<sub>n</sub>-SSO<sub>3</sub><sup>-</sup>, (CH<sub>2</sub>)<sub>n</sub>-S-S-(CH<sub>2</sub>)<sub>n</sub>, R\* derived from peptide or polypeptide linked to the vinylsulphone group via its terminal carboxylic acid group, wherein R<sub>1</sub> and R<sub>2</sub> is independently selected from C<sub>1</sub>-C<sub>4</sub> alkyl,

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wherein n is an integer in the range of 1 to 4 wherein within the same molecule n is not necessarily the same integer and wherein R# corresponds to an amino acid sidechain;

and salts thereof.

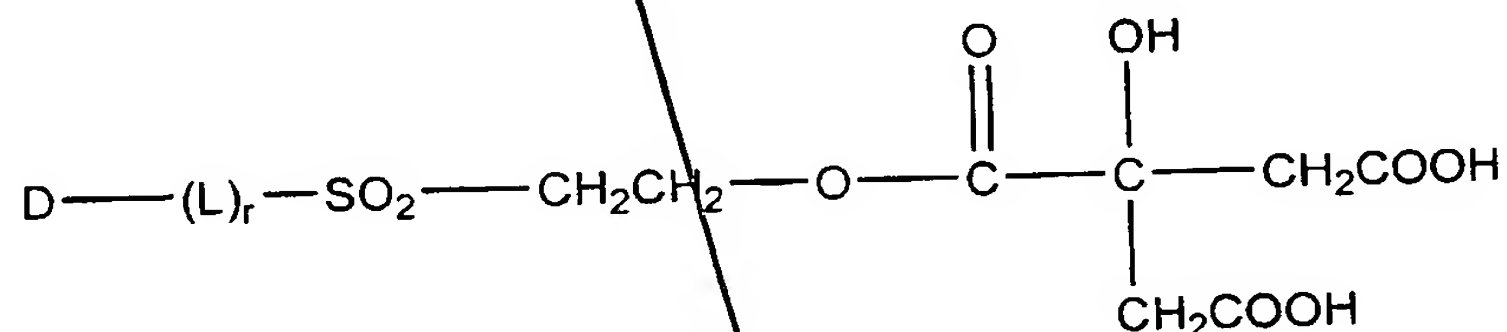
7. A reactive dye according to Claim 6 wherein R\* is selected from (CH<sub>2</sub>)<sub>n</sub>SH, (CH<sub>2</sub>)<sub>n</sub>NH<sub>2</sub>, C<sub>6</sub>H<sub>4</sub>N, CH(R#)NH<sub>2</sub>, CH(CH<sub>3</sub>)OH, CH(CH<sub>3</sub>)O(CO)CH(CH<sub>3</sub>)OH, C(OH)(CH<sub>2</sub>COOH)<sub>2</sub>, CH<sub>2</sub>C(OH)(COOH)CH<sub>2</sub>COOH, C(H)(CH<sub>3</sub>)OH, C(H)(OH)CH<sub>2</sub>COOH, CH<sub>2</sub>C(H)(OH)COOH, C(H)(OH)C(H)(OH)COOH, C<sub>6</sub>H<sub>4</sub>OH, C<sub>6</sub>H<sub>4</sub>NH<sub>2</sub>.
8. A reactive dye according to Claim 6 or 7 wherein R\* is C(OH)(CH<sub>2</sub>COOH)<sub>2</sub> or CH<sub>2</sub>C(OH)(COOH)CH<sub>2</sub>COOH or a derivative of a citric acid polymer.
9. A reactive dye compound according to any of Claims 6 to 8 wherein A is O.
10. A reactive dye compound having the structure:



(Ia)

wherein D, L, r are as defined above.

11. A reactive dye compound having the structure:



(Ib)

wherein D, L and r are as defined above.

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*Substantive*

- Sub A*
12. Use of a compound according to any of Claims 1 to 11 for dyeing cellulosic substrates, preferably cotton.
  13. Use of a compound according to any of Claims 1 to 11 for dyeing wool.
  14. Use of a compound according to any of Claims 1 to 11 for dyeing polyamide substrates, preferably nylon.
  15. Use of a compound according to any of Claims 1 to 11 for dyeing silk.
  16. Use of a compound according to any of Claims 1 to 11 for dyeing keratin, preferably hair.
  17. Use of a compound according to any of Claims 1 to 11 for dyeing leather.
  18. Process for the preparation of a compound according to any of Claims 1 to 11 comprising the steps of reacting a first starting material (preferably one mole) with a second starting material (preferably one mole), the first starting material comprising at least one chromophore, at least one  $\text{SO}_2\text{C}_2\text{H}_4$  which is attached to the chromophore group either directly via the sulphur atom of the  $\text{SO}_2\text{C}_2\text{H}_4$  group or via a linking group L, the second starting material comprising an oxy- or thio-carbonyl group.
  19. Process according to Claim 18 wherein the process is carried out at a pH of from about 2 to about 8, preferably from about 3 to about 5.
  20. Process according to Claim 18 or 19 wherein the second starting material is added to the first starting material slowly, preferably dropwise, preferably over several hours, preferably 1-5 hours, more preferably 2-3 hours.
  21. Product obtainable by a process according to any of Claims 18 to 20.
  22. A dye composition comprising the compound or product of any of Claims 1 to 11 or 18 to 21.

- Substant*
23. A dye composition according to Claim 22 wherein the composition is in the form of a solid mixture and further comprises an acid buffer.
24. A dye composition according to Claim 22 wherein the composition is in the form of a liquid and further comprises water and an acid buffer.
25. A dye composition according to Claim 22 wherein the composition is in the form of a paste and further comprises water, thickening agent and an acid buffer.
26. A dye composition according to Claim 22, 23, or 25 wherein the pH is preferably from about 2 to about 3.

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